

Competition Boost-Gliders

Trip Barber

NAR 4322

What it Takes to Win

- Reliability
- Good Boost
- Clean Transition to Glide
- Good Glide
- Returned Model

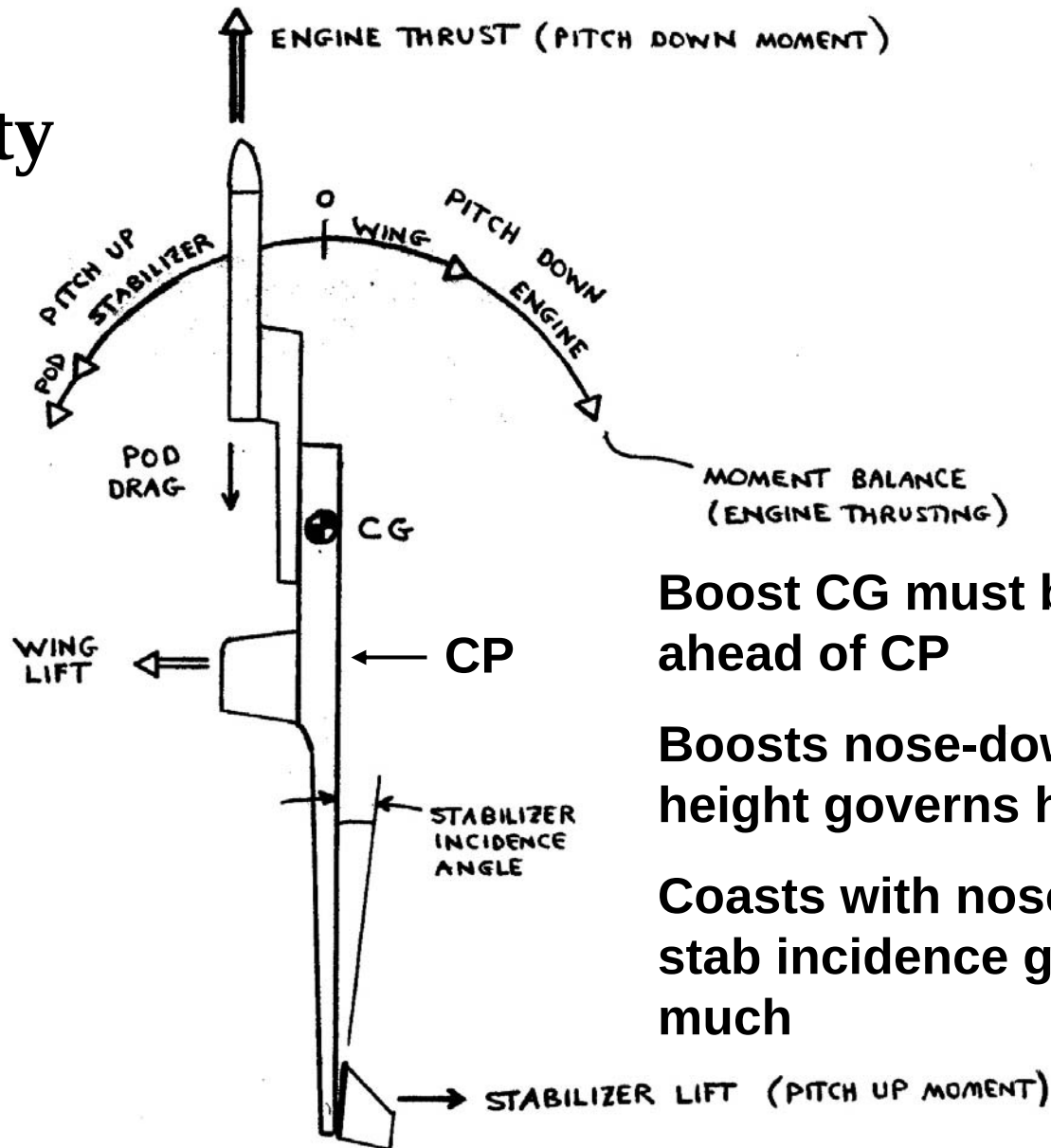
Glider Reliability

- Proper structural strength for boost
 - Balsa thickness & grain, gluing technique
- Good release from launcher
 - Restrain ignition clips from catching the tail, provide wind bracing so glider stays on pod
- Clean pod separation
 - Proper friction fit, small chute for recovery
- Practice makes perfect!

Good Boost

- Provide enough launch rod travel length
 - Use “power tower”, extended rod lengths
- Get the force balance and stability right
 - Thrust vs aerodynamic balance, CG vs CP
- Align wings correctly on pad
 - Wing span parallel to wind direction
- Use a smaller glider unless it's windy
 - High altitude = long duration

Boost Stability



Boost CG must be well
ahead of CP

Boosts nose-down, pod
height governs how much

Coasts with nose-up loop,
stab incidence governs how
much

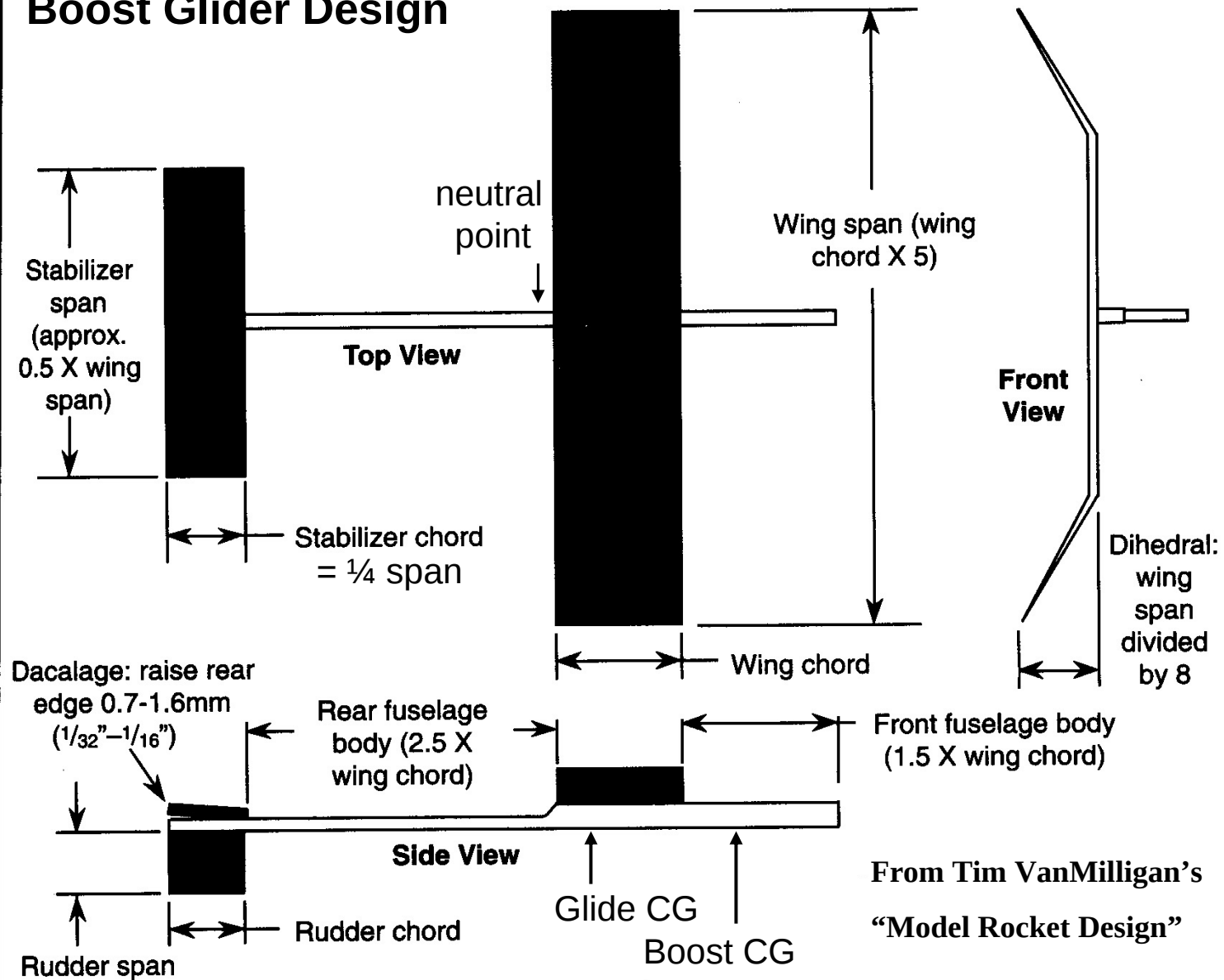
Clean Transition

- Put some ($\sim 2\%$) incidence on stabilizer
 - Pulls out of “death dives”
 - Too much incidence will cause boost loops & glide balance issues
- Trim for wide-diameter right turn
 - Check with hand launches straight up
- Choose proper delay time
 - Eject pod on the way up, not down

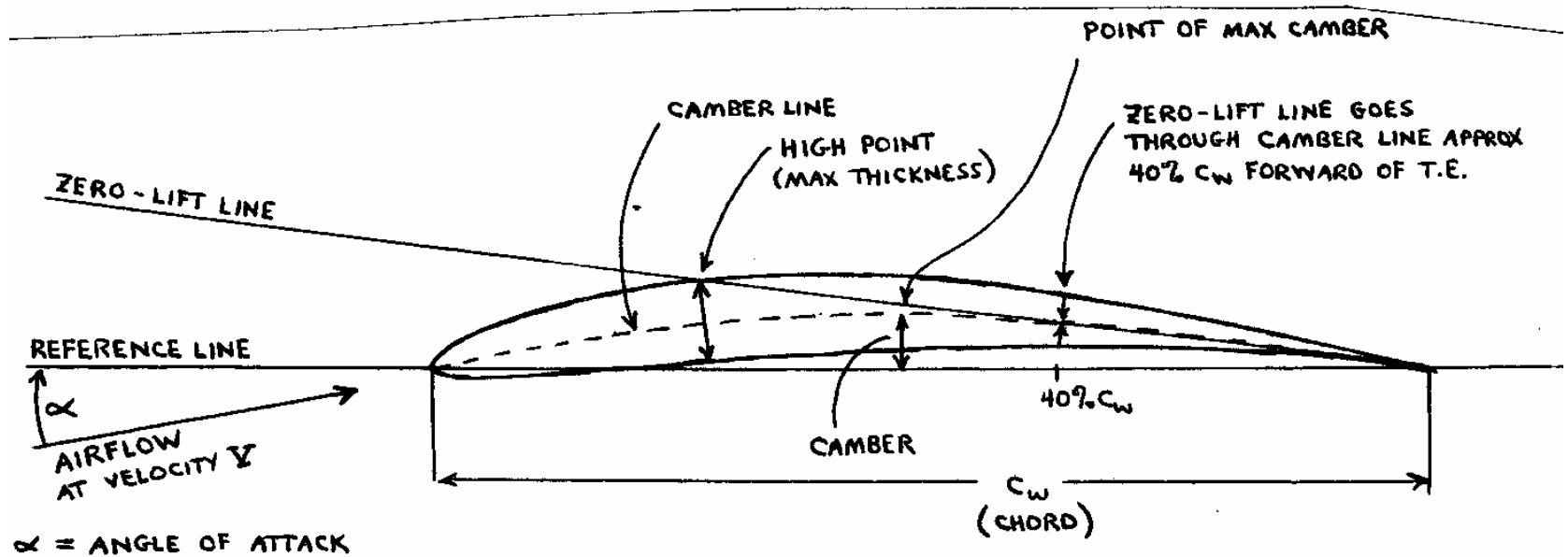
Good Glide

- Minimize glider drag and weight
 - Smooth wing surface, without paint
- Select and shape an appropriate airfoil
 - High point at 30% chord, taper wing thickness
- Minimize wing loading (weight / wing area)
- Trim to glide at a small angle of attack
 - Maximize $C_L^{1.5} / C_D$ for max duration
- Get the CG vs neutral point balance right
 - Glide CG at $\frac{3}{4}$ -chord point is ideal

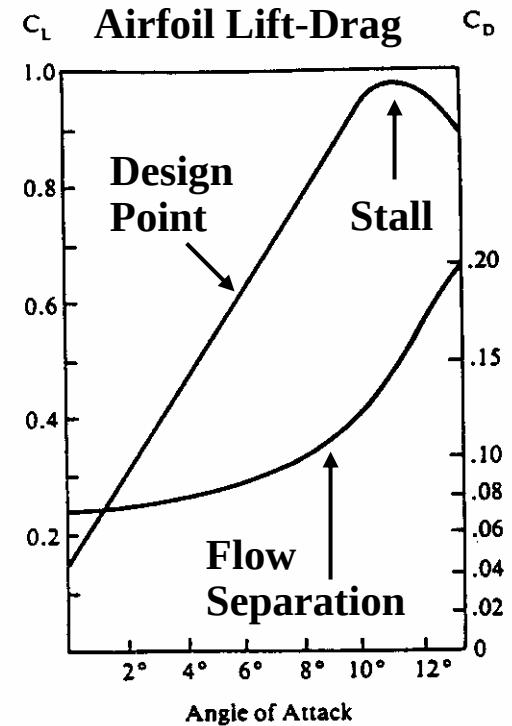
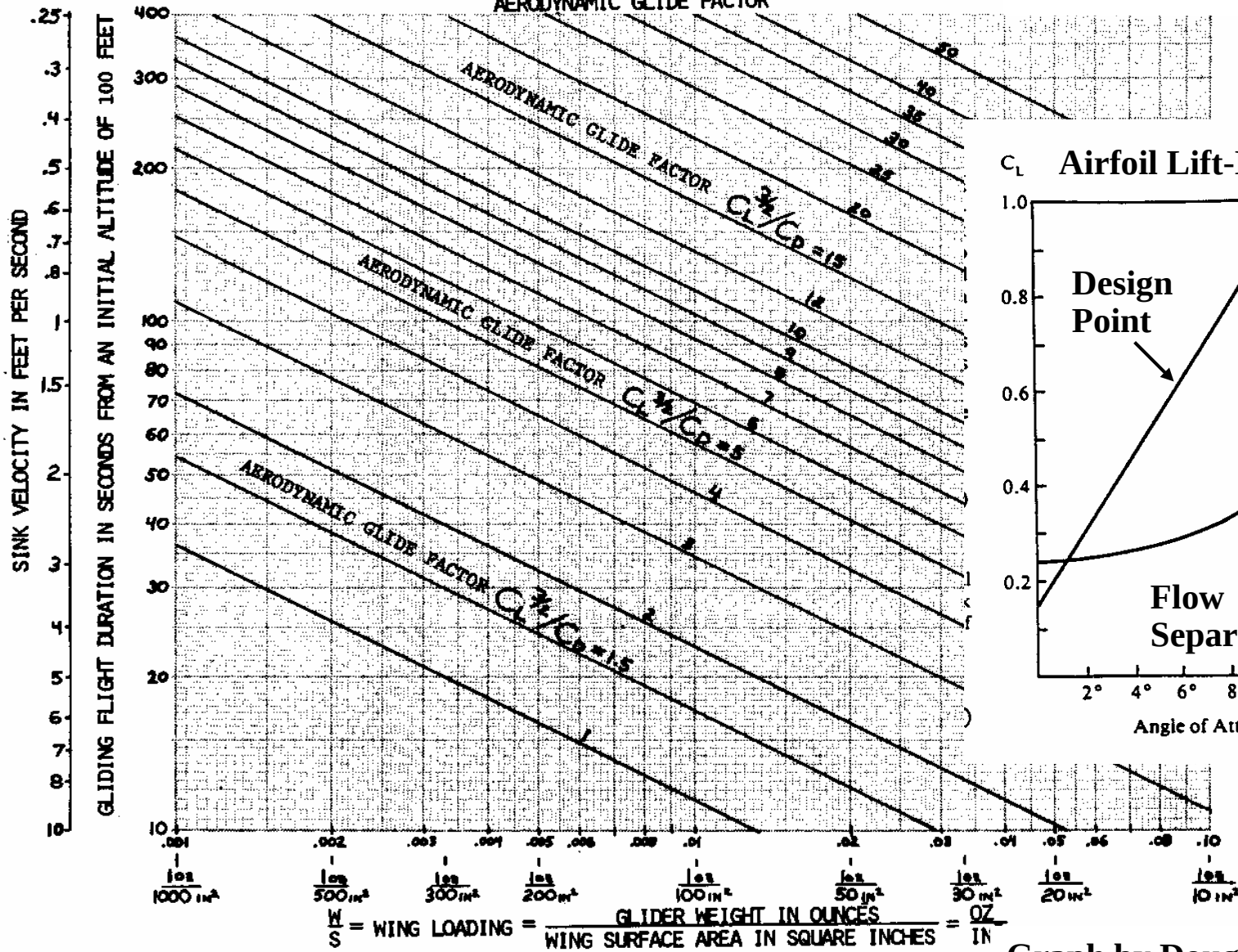
Boost Glider Design



Glider Airfoil



VARIATION OF GLIDING FLIGHT DURATION WITH WING LOADING AND AERODYNAMIC GLIDE FACTOR



Graph by Doug Malewicki

Glider Sizes

Engine Power	Wing Area (Sq. inches)	Wing & Boom Thickness	Stab/Rudder Thickness
½ A	15 – 25	3/32	1/32
A	20 – 35	1/8	1/16
B	30 – 45	1/8 – 3/16	1/16
C	40 – 60	3/16	3/32

Wings & stabilizers from 6 lb/ft³ density C-grain balsa
Fuselage booms from 12-16 lb density

Returning Models

- Enhance glider visibility
 - Dark magic marker on underside of wings, aluminized mylar on tops of wingtips
 - Use larger gliders in windy weather
- Use a dethermalizer
 - Wing flap, “beer can”, or drop weight
- Use radio control – at least for “C” and larger